ARTICLE III

CITY OF STEPHENVILLE

DESIGN STANDARDS
FOR
WATER SYSTEMS

ARTICLE III

WATER SYSTEM

SECTION 3.1 General

The purpose of this section is to establish minimum standard criteria for design of water distribution systems to serve development within the City of Stephenville.

The engineer responsible for the design of the proposed improvements shall submit testing reports performed by the Engineer of an independent testing laboratory with a verification statement to the Director of Utilities that the improvements have been constructed in accordance with the plans and specifications.

SECTION 3.2 Line Size

The minimum pipeline size to serve residential areas shall be six (6) inches in diameter and the minimum pipeline size serving commercial, business, industrial, and multi-family shall be eight (8) inches. In general, all water lines shall be looped with no dead ends. Dead end lines shall be provided with a flush valve or fire hydrant at the end. Dead end lines shall not exceed 1000 feet in length without prior approval of the City. Pipelines shall be sized to provide sufficient supply for fire flows in accordance with the minimum criteria of the State Board of Insurance and other governing authorities.

SECTION 3.3 Pipe Material

Water pipelines shall be either ductile iron (polywrapped), polyvinyl chloride (PVC) C-900, or concrete cylinder. In general, all water pipelines shall be minimum Class 150. Ductile iron pipe shall be a minimum Class 50 with a cement mortar liner. All service lines shall be Type "K" copper tubing. All pipe shall be new and approved by the Underwriters' Laboratory and shall be acceptable to the Texas State Fire Insurance Commission for use in water distribution systems without penalty. PVC water pipe shall also bear the seal of approval of the National Sanitation Foundation Testing Laboratory (NSF) for potable water pipe.

SECTION 3.4 Fittings

All fittings shall be cast iron or ductile iron (polywrapped) and shall comply with American Water Works Association Standard

Specification AWWA C110 or AWWA C111. Below grade fittings shall be either mechanical joint or push on joint. Adequate thrust blocking shall be provided at all fittings. Above grade fittings shall be flanged joints. Concrete cylinder pipe fittings shall be of the same material as the pipe. All copper fittings shall be compression fittings. No flare fittings shall be permitted.

SECTION 3.5 Fire Hydrants

In general, fire hydrants shall be located at each street intersection and at intervals on the interior of each block. Spacing of fire hydrants in single family residential areas shall not be over 500 feet apart along the street. Spacing of fire hydrants in the commercial, industrial or high density residential areas shall not be over 300 feet apart along the street. In all cases, the fire hydrant shall be within 500 feet of any portion of a building. If special conditions exist, the Fire Marshall may require additional hydrants for fire protection.

All fire hydrants shall be installed on a minimum six (6) inch main. There shall be a gate valve installed between the main and hydrant. Fire hydrants shall be located between five (5) and six (6) feet back of the curb.

All fire hydrants shall be three way feed with one pumper nozzle of 4.5 inches and two hose nozzles of 2.5 inches. The operating nut shall be a two (2) inch octagonal and shall open by turning to the left counterclockwise.

Fire hydrants shall be painted to meet the City's requirement for color code. In general, the developer shall furnish fire hydrants that have base and bonnet painted with a red paint. After the City performs the fire flow tests on the hydrant, the City will paint the bonnet with a color which corresponds to the flow on which it is located as shown in the following table:

Fire Hydrant Color Code

Main Flow Capacity	Color of Bonnet & Caps
0-500 gpm	Vermillion Red
500-1000 gpm	Yellow
Greater than 1000 gpm	Green

SECTION 3.6 Gate Valves

All gate valves shall be resilient seat gate valves. All gate

valves sixteen (16) inches and larger shall be furnished with by-pass valves. For valves sixteen (16) and larger, butterfly valves may be used as an alternative to gate valves. Any proposed alternative valves shall be submitted to the Director of Utilities for approval prior to installation. Valves shall open by turning counterclockwise and shall have a two (2) inch operating nut.

In general, gate valves shall be located at intersections to allow the isolation of lines for repairs. Valves shall e placed so that not more than 50 lots will be out of service while a line is shut down for repair. All valves shall be installed in the vertical position with a valve box and cover centered over the stem. A two (2) foot square and six (6) inch thick concrete pad shall be constructed around the top of the valve box in unpaved areas.

SECTION 3.7 Testing and Sterilization

All water pipelines shall be hydrostatically tested. The test shall include service lines, fire hydrants, flush valves, etc. and all testing shall be accomplished in the presence of a representative of the City of Stephenville. The developer shall be responsible for all expenses required to hydrostatically test the pipelines.

All facilities shall be flushed and sterilized. The developer will be required to submit samples to an approved laboratory for certification as being free of bacteria. The developer shall be responsible for sterilization and resterilization as necessary and all associated expenses. This shall be preformed in the presence of a representative of the City.

SECTION 3.8 Location and Installation

All water mains shall be located three and one half (3.5) feet behind the curb on the north/east side of the street. Installation shall be at the line and grade as shown on the plans. The mains shall have a minimum of forty-two (42) inches of cover in open areas. Water lines under existing streets and proposed streets shall have a minimum cover of forty-two (42) inches from the finish grade. Special attention shall be given to water lines in unimproved streets in order to provide for the future grading of those streets.

Water lines shall be embedded and backfilled. For trenches located in streets, the backfill shall be compacted to a minimum of 95% Standard Proctor Density.

All bends, fittings, etc. shall have concrete thrust blocking provided.

A tracer line shall be installed in conjunction with PVC pipe and shall be terminated at each valve location. The tracer line shall be installed twelve (12) inches above the pipe and shall be a 10 gauge insulated, colored blue.

ARTICLE IV

CITY OF STEPHENVILLE

DESIGN STANDARDS
FOR
SANITARY SEWER SYSTEMS

ARTICLE IV

SEWER SYSTEM

SECTION 4.1 General

The purpose of this section is to establish minimum standard criteria for design of sewer systems to serve development within the City of Stephenville.

The engineer responsible for the design of the proposed improvements shall submit testing reports performed by the Engineer of an independent testing laboratory with a verification statement to the Director of Utilities that the improvements have been constructed in accordance with the plans and specifications.

SECTION 4.2 Pipe Size and Grades

The minimum line size shall be six (6) inches in diameter. Sanitary sewer lines shall be designed to have a minimum mean velocity flowing full of 2.5 feet per second (fps). The minimum slope of the sewer lines shall conform to the minimums recommended by the TDH and maximum velocity shall not exceed 10 fps.

SECTION 4.3 Pipe Material

Sanitary sewer pipe shall be polyvinyl chloride pipe (PVC) SDR 35.

All pipe shall be new and approved by the Underwriter's Laboratories, Inc. and the PVC pipe shall also bear the seal of approval of the National Sanitation Foundation Testing Laboratory (NSF).

SECTION 4.4 Manholes

Manholes shall be located at all intersections of sewer pipelines, changes in grade, changes in alignment and at distances not to exceed 500 feet. Manholes shall be constructed of precast reinforced concrete pipe. Brick manholes will not be allowed. Where PVC pipe enters manholes, an asbestos-cement coupling with rubber ring joint shall be used to provide a watertight connection.

All manholes shall have twenty-four (24) inch standard manhole rings and covers. Covers shall have pick bars and the word "sewer"

visible in the casting. Watertight rings and covers shall be furnished in areas subject to flooding.

SECTION 4.5 Drop Manhole

Drop manholes shall be used at locations where the elevation of the incoming sewer line is two (2.0) feet or greater from the elevation of the outgoing line. Construction shall be the same as the standard manhole. The drop piping shall be PVC pipe.

SECTION 4.6 Cleanouts

Cleanouts shall be constructed at the upper end of all sewer mains. Cleanouts shall be constructed of the same material and same size as the sewer main. The top shall have a cast iron boot with cover. A two (2) feet by two (2) feet nine (9) inches by six (6) inches thick concrete pad shall be placed around this boot.

SECTION 4.7 Force Main

Force Main: Force main materials and installation shall be in accordance with Article III, Water System.

SECTION 4.8 Lift Stations

Lift stations shall be designed in accordance with the criteria of the TDH. Design data will be submitted to the City of Stephenville and TDH and approved on a case-by-case basis.

SECTION 4.9 Testing

All sewer pipe shall have deflection tests performed on them. This test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed the manufacturer's recommended deflection. Tests shall be performed using a properly sized "go - no go" mandrel.

All sewer lines shall be tested for infiltration/exfiltration. The method of testing the pipe shall be by using the "Low-Pressure Air Test". All manholes shall be tested by using vacuum or hydrostatic methods in accordance with City standard specifications. All testing shall be conducted in the presence of a City representative. All expenses for this work shall be the developer's responsibility.

SECTION 4.10 Location and Installation

All sewer mains shall be constructed on the opposite side of the street from the water mains. Sewer mains shall be constructed to the line and grade as shown on the plans. Manholes shall be located at lot lines whenever possible. The sewer line shall be located four (4) feet back of curbs and in rural areas without curb, they shall be located four (4) to eight (8) feet from the edge of pavement. Manholes are not to be located in the bottom of bar ditches.

Sewer lines shall be embedded and backfilled. For trenches located in streets, the backfill shall be compacted to a minimum of 95% Standard Proctor Density.

A tracer line shall be installed with PVC pipe and be terminated in each manhole. The tracer line shall be installed twelve (12) inches above the pipe and shall be a 10 gauge insulated green wire.